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Application No.: 10/714,464

Art Unit: 1745

Docket No.: IIW-035

AMENDMENTS TO THE CLAIMS

1. (currently amended) A fuel cell system comprising:

~~humidifier for humidifying a fuel cell composed of an anode side humidifier for~~
humidifying a fuel gas and a cathode side humidifier for humidifying a reactant gas, wherein
each humidifier includes ~~possessing~~ a plurality of hollow fiber membrane modules for migrating
moisture between a supply gas, which is supplied to a fuel cell, and an exhaust gas, which is
exhausted from the fuel cell to thereby humidify the supply gas, ~~said humidifier comprising:~~

a pair of heads which hold both ends of said hollow fiber membrane modules,

a connecting member which connects each of the heads, and

a device for warming the supply gas composed of conduits through which a cooling
medium exhausted from the fuel cell is passed, said device including a first conduit disposed
along said connecting member, a second conduit disposed around an outer circumference of one
of said pair of heads, and a third conduit disposed around an outer circumference of the other of
said pair of heads;

wherein said device for warming the supply gas is configured to first warm a
humidifier at an outlet side of the supply gas, and subsequently warm a humidifier at an inlet
side of the supply gas.

2. (currently amended) ~~The humidifier~~ fuel cell system according to Claim 1, wherein said
device for warming the supply gas is configured to first warm the cathode side humidifier at an
outlet side of the supply gas.

3. (currently amended) ~~The humidifier~~ fuel cell system according to Claim 2, wherein said
device for warming the supply gas is configured to first warm the cathode side humidifier at an
outlet side of the supply gas, and then warm the cathode side humidifier at the inlet side of the
supply gas.

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4. (currently amended) The ~~humidifier~~ fuel cell system according to Claim 3, wherein said device for warming the supply gas warms the anode side humidifier at an outlet side of the supply gas after warming the cathode side humidifier at the inlet side of the supply gas.

5. (currently amended) The ~~humidifier~~ fuel cell system according to claim 1, wherein said device for warming the supply gas is composed of at least one conduit configured so as to follow said heads.

6. (withdrawn) A process for warming a humidifier for fuel cell comprising an anode side humidifier and a cathode side humidifier each possessing a plurality of hollow fiber membrane modules for migrating moisture between a supply gas, which is supplied to a fuel cell, and an exhaust gas, which is exhausted from the fuel cell to thereby humidify the supply gas,

said process comprising

a first step of warming the humidifier at an outlet side of the supply gas by a heated cooling medium just exiting said fuel cell; and

a second step of warming the supply gas at an inlet side by the cooling medium after warming the humidifier at the outlet side of the supply gas.

7. (withdrawn) A humidifier for humidifying a fuel cell, comprising:

a hollow fiber membrane module for migrating moisture between a supply gas, which is supplied to a fuel cell, and an exhaust gas, which is exhausted from the fuel cell to thereby humidify the supply gas;

a supply gas inlet head and a supply gas outlet head for holding both ends of the hollow fiber membrane module therebetween,

a connecting member for connecting the supply gas inlet head and the supply gas outlet head, and

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a warming device for warming the humidifier including a first conduit in communication with a cooling medium outlet of the fuel cell through which a cooling medium exhausted from the fuel cell is passed, wherein the first conduit is arranged relative to the supply gas outlet head to warm the supply gas exiting the humidifier by heat exchange with the cooling medium passing through the first conduit, and a second conduit in communication with the first conduit and arranged relative to the supply gas inlet head for warming the supply gas entering the humidifier by heat exchange with the cooling medium after warming the supply gas exiting the humidifier.

8. (withdrawn) The humidifier of claim 7, wherein the second conduit communicates with a cooling medium inlet of the fuel cell to pass the cooling medium to the fuel cell after warming the supply gas.

9. (withdrawn) The humidifier of claim 7, wherein the warming device is unified with the connecting member.

10. (withdrawn) The humidifier of claim 9, wherein the connecting member further comprises a conduit for conveying the exhaust gas from the fuel cell for humidifying the supply exhaust.

11. (withdrawn) The humidifier of claim 7, wherein the supply gas is air.

12. (withdrawn) The humidifier of claim 11, wherein the warming device further includes a conduit for warming hydrogen gas exiting the humidifier.

13. (withdrawn) A warming device for warming a humidifier for a fuel cell, comprising:

a first conduit in communication with a cooling medium outlet of the fuel cell for conveying heated cooling medium from the fuel cell to a supply gas outlet side of the humidifier to warm a supply gas exiting the humidifier by heat exchange with the heated cooling medium; and

a second conduit for conveying the heated cooling medium from the supply gas outlet side of the humidifier to a supply gas inlet side of the humidifier to warm a supply gas entering the humidifier by heat exchange with the heated cooling medium.

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14. (withdrawn) The warming device of claim 13, wherein the supply gas is air.

15. (withdrawn) A humidifier for a fuel cell, comprising

a hollow fiber membrane module for migrating moisture between a supply gas, which is supplied to the fuel cell, and an exhaust gas, which is exhausted from the fuel cell to thereby humidify the supply gas,

a first head and a second head for holding the module therebetween, the first head having an inlet to the module for the supply gas, the second head having an outlet from the module for the supply gas, and

a connecting member for connecting the first and second heads, the connecting member including a first conduit for conveying exhaust gas and a second conduit for conveying heated cooling medium from the fuel cell for warming the humidifier.

16. (withdrawn) A method of warming a humidifier for a fuel cell, comprising the steps of

conveying a heated cooling medium from the fuel cell to a supply gas outlet side of the humidifier to heat a supply gas exiting the humidifier, and

after conveying the heated cooling medium to the supply gas outlet side, conveying the heated cooling medium to a supply gas inlet side of the humidifier to heat a supply gas entering the humidifier.

17. (withdrawn) The method of claim 16, further comprising the step of conveying the heated cooling medium to an exhaust gas inlet of the humidifier to heat an exhaust gas entering the humidifier.

18. (withdrawn) The method of claim 16, further comprising the step of:

conveying the cooling medium to a cooling medium of the inlet after heating the supply gas entering the humidifier.

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19. (withdrawn) The method of claim 16, wherein the supply gas is air.

20. (withdrawn) The method of claim 19, further comprising the step of warming hydrogen entering the fuel cell after warming the air.